5727-72828

OIPE JC173
JUL 2 2 2004
PATENT & TRADEMARK OFFICE

1 FW AF

BARNES & THORNBURG

11 South Meridian Street
Indianapolis, Indiana
46204
(317) 236-1313
(317) 231-7433 Fax

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group:	1743
Confirmation No.:	5090
Application No.:	09/541,552
Invention:	Biosensor Electromagnetic Noise Cancellation
Applicant:	Maury Zivitz
Filed:	April 3, 2000
Attorney Docket:	5727-72828
Examiner:	Arlen Soderquist

Certificate Under 37 CFR 1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

on July 19, 2004

Kim Tyree
(Signature)

Kim Tyree
(Printed Name)

APPEAL BRIEF

Mail Stop Appeal Brief
Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

This appeal brief is submitted in triplicate in furtherance of the appeal taken May 20, 2004. The Commissioner is hereby authorized to charge the $330 fee for filing this appeal brief, as well as any other fees which may be necessary to constitute this a timely filed appeal brief, to Appellant's undersigned counsel's deposit account 10-0435, with reference to file number 5727-72828. A duplicate copy of this authorization is enclosed for this purpose.

Real Party In Interest

The real party in interest is Roche Diagnostics Operations, Inc., pursuant to an assignment recorded in the records of the Patent Office at reel 010681, beginning at frame 0430, and an assignment which has not yet been submitted to the Patent Office for recording.

07/22/2004 AADOF01 00000032 100435 09541552
01 FC:1402 330.00 DA

Related Appeals and Interferences

There are no related appeals or interferences of which the undersigned is aware.

Status of Claims

Claims 1-20 and 24-42, all of the claims remaining in this application, are finally rejected. The final rejections of all of claims 1-20 and 24-42 are appealed.

Status of Amendments

No amendments remain unentered.

Summary of the Invention

The invention may best be understood by referring to the appealed claims 1-20 and 24-42, annotated with parenthetic notes from the application as filed.

With reference to claim 1, a Cottrell current-type biosensing cell assembly (10, 30, 130, 230, 330) comprises a substrate (16, 116, 216) having a proximal end and a distal end, and a measurement loop (26) located on the substrate (16, 116, 216). The measurement loop (26) includes a pair of spaced-apart conductors (12, 14), each having a proximal end and a distal end, the proximal ends located at the proximal end of the substrate (16, 116, 216) for connection to an instrument (40, 54, 56, 340), and a test cell (22) connected across the distal ends of the conductors (12, 14). The test cell (22) has an analyte reaction zone (22) with an electrical impedance (for example, 20 KΩ to 100 KΩ; page 3, lines 5-9) that varies in response to analyte concentration. The variation in electrical impedance of the analyte reaction zone (22) in response to the application of an analyte, the concentration of which is to be determined, produces a Cottrell current-like profile (page 1, lines 2-6). The Cottrell current-type biosensing cell assembly (10, 30, 130, 230, 330) further comprises a noise cancellation loop (32) electrically distinct from the analyte reaction zone (22) and physically arranged (for example, by closely surrounding loop 26 as in Figs. 2 and 9, or by positioning loops 26 and 32 adjacent each other as in Fig. 4, or by placing the measurement loop 26 on one side of the substrate 216 and the noise cancellation loop 32 on the other side of the substrate 216 as in Figs. 5-6, or by providing the noise cancellation loop 32 in a shelf 54 arranged so as to be generally congruent with the measurement loop 26 when the test strip

10 is inserted into the instrument 56 as in Figs. 7-8) to be exposed to substantially the same electromagnetic environment as the measurement loop (26) and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly (10, 30, 130, 230, 330).

With reference to claim 2, the noise cancellation loop (32) of the biosensing cell assembly (30, 130, 230, 330) of claim 1 is on the substrate (Fig. 2; 116, Fig. 4; 216, Figs. 5-6; Fig. 9).

With reference to claim 3, the measurement loop (26) and the noise cancellation loop (32) of the biosensing cell assembly (30, 130, 330) of claim 2 are on the same side of the substrate (Fig. 2; 116, Fig. 4; Fig. 9).

With reference to claim 4, the measurement loop (26) and the noise cancellation loop (32) of the biosensing cell assembly (30, 330) of claim 3 circumscribe generally the same area (Fig. 2, Fig. 9).

With reference to claim 5, the measurement loop (26) and the noise cancellation loop (32) of the biosensing cell assembly (30, 130, 330) of claim 3 are located adjacent each other (Fig. 2; 116, Fig. 4; Fig. 9).

With reference to claim 6, the measurement loop (26) and the noise cancellation loop (32) of the biosensing cell assembly (230) of claim 2 are on opposite sides of the substrate (216, Figs. 5-6).

With reference to claim 7, the measurement loop (26) and the noise cancellation loop (32) of the biosensing cell assembly (230) of claim 6 are substantially congruent (Figs. 5-6).

With reference to claim 8, an instrument (56, Figs. 7-8) is electrically connectable to the measurement loop (26) of the biosensing cell assembly (10) of claim 1, and the noise cancellation loop (32) is located on a structure (54) adjacent the measurement loop (26) when the measurement loop (26) is connected to the instrument (56, Figs. 7-8).

With reference to claim 9, the noise cancellation loop (32) of the biosensing cell assembly (10) of claim 8 is substantially congruent (Figs. 7-8) to the measurement loop (26).

With reference to claim 10, the measurement loop (26) of the biosensing cell assembly (30, 330) of claim 1 is physically arranged to have a first current (46) induced therein having a first phase associated therewith when the measurement loop (26) is exposed to an ambient electromagnetic field, and the noise cancellation loop (32) is physically arranged to have a second current (46, 48) induced therein, the second current (46, 48) having

a second phase associated therewith when the noise cancellation loop (32) is exposed to the same ambient electromagnetic field. The first and second currents (46; 46, 48) are combined (at nodes 51, 62) to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly (10, 30, 130, 230, 330).

With reference to claim 11, the first and second currents (46; 46, 48) in the biosensing cell (30, 330) of claim 10 are combined (at nodes 51, 62) to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly (30, 330).

With reference to claim 12, the biosensing cell assembly (30, 330) of claim 10 further includes means (40, 340) for determining a response current (at node 52) to provide an indication of an analyte concentration.

With reference to claim 13, the means (40, 340) for determining the response current (at node 52) in the biosensing cell assembly (30, 330) of claim 12 comprises a voltage source (44, 344) to apply a voltage across the test cell (22) via the pair of conductors (12, 14) in the measurement loop (26) and an amplifier (42; 64, 342) connected to amplify the response current (at nodes 51, 62) resulting therefrom.

With reference to claim 14, the measurement loop (26) and the noise cancellation loop (32) of the biosensing cell assembly (30) of claim 13 are physically arranged to have the phase of the second current (48) displaced by 180 degrees from the phase of the first current (46) and the measurement loop (26) and the noise cancellation loop (32) are electrically connected (44+ and node 51) to add the first and second currents (46, 48) together.

With reference to claim 15, the measurement loop (26) and the noise cancellation loop (32) of the biosensing cell assembly (330) of claim 13 are physically arranged to have the first and second currents (46, 46) in phase with each other and the measurement loop (26) and the noise cancellation loop (32) are electrically connected (344+, nodes 51 and 62) to subtract the second current (46) from the first current (46).

With reference to claim 16, the electrical impedance of the test cell (22) of the biosensing cell assembly (10, 30, 130, 230, 330) of claim 1 varies within a predetermined range (page 3, lines 2-9) in response to various concentrations of the analyte.

With reference to claim 17, a predetermined impedance (38) is included in the noise cancellation loop (32) of the biosensing cell assembly (10, 30, 130, 230, 330) of claim 16.

With reference to claim 18, the predetermined impedance (38) included in the noise cancellation loop (32) of the biosensing cell assembly (10, 30, 130, 230, 330) of claim

17 is within the impedance range (page 3, lines 2-9) of the test cell (22) when the test cell (22) is amperometrically monitoring a response current (at node 52) to provide an indication of the analyte concentration.

With reference to claim 19, the impedance (38) in the noise cancellation loop (32) of the biosensing cell assembly (10, 30, 130, 230, 330) of claim 17 is substantially frequency independent (page 4, lines 2-9).

With reference to claim 20, the noise cancellation loop (32) of the biosensing cell assembly (10, 30, 130, 230, 330) of claim 17 has a pair of conductors (34, 36). The combination of the impedance in the noise cancellation loop (32), together with the conductors (34, 36) of the noise cancellation loop (32), has substantially the same frequency response characteristics (page 4, lines 2-9) as the combination of the test cell (22) and conductors (12, 14) of the measurement loop (26).

With reference to claim 24, a method is provided for adjusting the output of a Cottrell current-type biosensing cell assembly (10, 30, 130, 230, 330) comprising a substrate (16, 116, 216) having a proximal end and a distal end, and a measurement loop (26) located on the substrate (16, 116, 216). The measurement loop (26) includes a pair of spaced-apart conductors (12, 14), each having a proximal end and a distal end. The proximal ends are located at the proximal end of the substrate (16, 116, 216) for connection to an instrument (40, 54, 56, 340). The measurement loop (26) further includes a test cell (22) connected across the distal ends of the conductors (12, 14). The test cell (22) has an analyte reaction zone (22) with an electrical impedance (for example, 20 KΩ to 100 KΩ; page 3, lines 5-9) that varies in response to analyte concentration. The variation in electrical impedance of the analyte reaction zone (22) in response to the application of an analyte, the concentration of which is to be determined, produces a Cottrell current-like profile (page 1, lines 2-6). The method includes providing a noise cancellation loop (32) electrically distinct from the analyte reaction zone (22) and physically arranged (for example, by closely surrounding loop 26 as in Figs. 2 and 9, or by positioning loops 26 and 32 adjacent each other as in Fig. 4, or by placing the measurement loop 26 on one side of the substrate 216 and the noise cancellation loop 32 on the other side of the substrate 216 as in Figs. 5-6, or by providing the noise cancellation loop 32 in a shelf 54 arranged so as to be generally congruent with the measurement loop 26 when the test strip 10 is inserted into the instrument 56 as in Figs. 7-8) to be exposed to substantially the same electromagnetic environment as the measurement loop (26) and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly (10, 30, 130, 230, 330).

With reference to claim 25, providing a noise cancellation loop (32) in the method of claim 24 comprises providing a noise cancellation loop (32) on the substrate (Fig. 2; 116, Fig. 4; 216, Figs. 5-6; Fig. 9).

With reference to claim 26, providing the noise cancellation loop (32) in the method of claim 25 comprises providing a noise cancellation loop (32) on the same side of the substrate (Fig. 2; 116, Fig. 4; Fig. 9) as the measurement loop (26).

With reference to claim 27, providing the noise cancellation loop (32) in the method of claim 26 comprises providing a noise cancellation loop (32) that circumscribes generally the same area (Fig. 2, Fig. 9) as the measurement loop (26).

With reference to claim 28, providing the noise cancellation loop (32) in the method of claim 26 comprises providing a noise cancellation loop (32) adjacent (Fig. 2; 116, Fig. 4; Fig. 9) the measurement loop (26).

With reference to claim 29, providing the noise cancellation loop (32) in the method of claim 25 comprises providing a noise cancellation loop (32) on an opposite side of the substrate (216, Figs. 5-6) from the measurement loop (26).

With reference to claim 30, providing the noise cancellation loop (32) in the method of claim 29 comprises providing a noise cancellation loop (32) which is substantially congruent (Figs. 5-6) with the measurement loop (26).

With reference to claim 31, the method of claim 24 further comprises providing an instrument (56, Figs. 7-8) electrically connectable to the measurement loop (26), and providing the noise cancellation loop (32) comprises providing a noise cancellation loop (32) on a structure (54) adjacent the measurement loop (26) when the measurement loop (26) is connected to the instrument (56, Figs. 7-8).

With reference to claim 32, providing the noise cancellation loop (32) in the method of claim 31 comprises providing a noise cancellation loop (32) which is substantially congruent (Figs. 7-8) to the measurement loop (26).

With reference to claim 33, the measurement loop (26) of the method of claim 24 is physically arranged to have a first current (46) induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field. Providing the noise cancellation loop (32) comprises providing a noise cancellation loop (32) which is physically arranged to have a second current (46, 48) induced therein, the second current (46, 48) having a second phase associated therewith when the noise cancellation loop (32) is exposed to the same ambient electromagnetic field. The first and second currents (46; 46, 48) are combined (at nodes 51, 62) to substantially reduce the effect of the ambient electromagnetic field on the

biosensing cell assembly (10, 30, 130, 230, 330).

With reference to claim 34, combining (at nodes 51, 62) the first and second currents (46; 46, 48) in the method of claim 33 to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly (30, 330) comprises combining the first and second currents (46; 46, 48) to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly (30, 330).

With reference to claim 35, the method of claim 33 further includes determining (40, 340) a response current (at node 52) to provide an indication of an analyte concentration.

With reference to claim 36, determining (40, 340) the response current of the method of claim 35 comprises providing a voltage source (44, 344) to apply a voltage across the test cell (22) via the pair of conductors (12, 14) in the measurement loop (26) and providing an amplifier (42; 64, 342) connected to amplify the response current (at nodes 51, 62) resulting therefrom.

With reference to claim 37, the method of claim 36 comprises arranging the measurement loop (26) and the noise cancellation loop (32) physically so that the phase of the second current (48) is displaced by 180 degrees from the phase of the first current (46) and electrically connecting (44+ and node 51) the measurement loop (26) and the noise cancellation loop (32) to add the first and second currents (46, 48) together.

With reference to claim 38, the method of claim 36 comprises physically arranging the measurement loop (26) and the noise cancellation loop (32) so that the first and second currents (46, 46) are in phase with each other and electrically connecting (344+, nodes 51 and 62) the measurement loop (26) and the noise cancellation loop (32) to subtract the second current (46) from the first current (46).

With reference to claim 39, the electrical impedance of the test cell (22) of the method of claim 24 varies within a predetermined range (page 3, lines 2-9) in response to various concentrations of the analyte. Providing a noise cancellation loop (32) in the method of claim 24 includes providing in the noise cancellation loop (32) a predetermined impedance (38).

With reference to claim 40, providing in the noise cancellation loop (32) of the method of claim 39 a predetermined impedance (38) comprises providing in the noise cancellation loop (32) a predetermined impedance (38) within the predetermined range (page 3, lines 2-9) of the electrical impedance of the test cell (22).

With reference to claim 41, providing in the noise cancellation loop (32) of the

method of claim 39 a predetermined impedance (38) comprises providing in the noise cancellation loop (32) a predetermined impedance (38) which is substantially frequency independent (page 4, lines 2-9).

With reference to claim 42, providing a noise cancellation loop (32) in the method of claim 39 comprises providing a noise cancellation loop (32) having a pair of conductors (34, 36). The combination of the predetermined impedance (38) and the pair of conductors (34, 36) of the noise cancellation loop (32) has a frequency response characteristics which is substantially the same as the frequency response characteristic (page 4, lines 2-9) of the combination of the test cell (22) and conductors (12, 14) of the measurement loop (26).

Issues

The issues on appeal include:

(1) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of Parks U. S. Patent 4,999,582 (hereinafter **Parks**), H. W. van Rooijen and H. Poppe, "Noise And Drift Phenomena In Amperometric And Coulometric Detectors For HPLC And FIA," Journal Of Liquid Chromatography, 6 (12), 2231-2254 (1983) (hereinafter **van Rooijen**) and Shults, W. D., F. E. Haga, T. R. Mueller and H. C. Jones, "Chronopotentiometer With Compensation For Extraneous Currents," Analytical Chemistry, 37 (11), 1415-1416 (1965) (hereinafter **Shults**);

(2) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and Eifler U. S. Patent 4,233,033 (hereinafter **Eifler**);

(3) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and Yasuda U. S. Patent 4,244,918 (hereinafter **Yasuda '918**);

(4) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and Yasuda U. S. Patent 4,277,439 (hereinafter **Yasuda '439**);

(5) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and Yasuda U. S. Patent 4,303,613 (hereinafter **Yasuda '613**);

(6) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and Tien U. S. Patent 4,387,359

(hereinafter **Tien**);

(7) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks**, **van Rooijen** and Raymond U. S. Patent 4,571,543 (hereinafter **Raymond**);

(8) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks**, **van Rooijen** and Wohltjen U. S. Patent 4,572,900 (hereinafter **Wohltjen**);

(9) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks**, **van Rooijen** and Stanbro U. S. Patent 4,935,207 (hereinafter **Stanbro**);

(10) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks**, **van Rooijen** and Pribat U. S. Patent 5,017,340 (hereinafter **Pribat**);

(11) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of White U. S. Patent 5,352,351 (hereinafter **White**), **van Rooijen** and **Shults**;

(12) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Eifler**;

(13) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Yasuda '918**;

(14) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Yasuda '439**;

(15) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Yasuda '613**;

(16) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Tien**;

(17) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Raymond**;

(18) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Wohltjen**;

(19) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Stanbro**; and,

(20) whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Pribat**.

Grouping of Claims

All of claims 1-20 and 24-42 are believed to be separately patentable, at least for the reasons set forth above in the **Summary of the Invention** and the following **Argument**.

Argument

Rejection 1 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Shults**

The Examiner relies upon **Parks** to teach an amperometric biosensor including two spaced apart electrodes 12, 14 which form a measurement loop that includes a test cell 10 on a substrate 16. The test cell includes a cover sheet 18 provided with openings 20, 24 through which the electrodes are exposed. A reaction zone is defined adjacent one, 20, of the openings. The reaction current is referred to as Cottrell current. The Examiner concedes that **Parks** does not teach a noise cancellation loop to cancel the effects of electromagnetically propagated energy.

The Examiner observes that **van Rooijen** discusses three different methods for ascertaining a relation between the capacitance of the working electrodes of amperometric and coulometric electrochemical detectors with solid electrodes for high-performance liquid chromatography and flow-injection analysis and the noise generated in such detectors. The three methods noted by the Examiner are: (1) direct correlation of noise with capacitance; (2) time correlation functions; and, (3) electrical simulation of the properties of the cells of such electrochemical detectors. The Examiner notes that **van Rooijen** specifically mentions at page 2232 several different causes of drift and noise including temperature fluctuations and electronic equipment. The Examiner notes that in the theoretical section of **van Rooijen**, the authors teach that a potential difference is applied to the electrodes followed by measurement of current or voltage, depending on the type of detector.

The Examiner relies upon **Shults** to teach a chronopotentiometer with compensation for extraneous currents. The Examiner believes **Shults** teaches a second measurement loop for compensating for, for example, the charging of the electrical double layers at the electrode-solution interface, the electrolysis of minor and major components of the medium (exclusive of the electroactive species of interest), and the electrolytic reduction or oxidation of the electrode(s) itself (themselves). The Examiner calls Applicant's attention particularly to uncompensated and compensated chronopotentiograms (Fig. 2 of **Shults**) which, the Examiner believes, support the Examiner's reliance upon **Shults**.

Parks neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Parks neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Parks neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Parks neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Parks neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Parks neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Parks neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Parks neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Parks neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Parks neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient

electromagnetic field on the biosensing cell assembly."

Parks neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Parks neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Parks neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Parks neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Parks neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Parks neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Parks neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Parks neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a

test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Parks neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Parks neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Parks neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Parks neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Parks neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Parks neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Parks neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Parks neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Parks neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Parks neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled

to allowance at least on this basis.

Parks neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Parks neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Parks neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Parks neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Parks neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Parks** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

van Rooijen neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

van Rooijen neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

van Rooijen neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate"

[containing a test cell and a measurement loop].

van Rooijen neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

van Rooijen neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

van Rooijen neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

van Rooijen neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

van Rooijen neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

van Rooijen neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

van Rooijen neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

van Rooijen neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

van Rooijen neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first

and second currents together."

van Rooijen neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

van Rooijen neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

van Rooijen neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

van Rooijen neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

van Rooijen neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

van Rooijen neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

van Rooijen neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

van Rooijen neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

van Rooijen neither discloses nor suggests claim 27's specifically recited

"noise cancellation loop that circumscribes generally the same area as the measurement loop."

van Rooijen neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

van Rooijen neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

van Rooijen neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

van Rooijen neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

van Rooijen neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

van Rooijen neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

van Rooijen neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

van Rooijen neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

van Rooijen neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first

and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

van Rooijen neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

van Rooijen neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

van Rooijen neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **van Rooijen** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

Shults neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Shults neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Shults neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Shults neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Shults neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Shults neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on

which they are both arranged.

Shults neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Shults neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Shults neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Shults neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Shults neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Shults neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Shults neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least

on this basis.

Shults neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Shults neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Shults neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Shults neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Shults neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Shults neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Shults neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Shults neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Shults neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Shults neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Shults neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Shults neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Shults neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Shults neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Shults neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Shults neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Shults neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Shults neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Shults neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Shults neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Shults** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

Some motivation must be found in the prior art of record for constructing the electromagnetic noise-canceling biosensor of the claims. However, no motivation is found where motivation must be to make out a *prima facie* case of 35 U.S.C. §103 obviousness. That is, no motivation is found in the prior art of record. Rather, the only source for the motivation to construct the electromagnetic noise-canceling biosensor of Appellant's claims is Appellant's claims themselves. Using the claims as the source for the motivation to construct the claimed electromagnetic noise-canceling biosensor does not make out a *prima facie* case of 35 U.S.C. §103 obviousness. Quite the contrary, Appellant submits. It makes out a *prima facie* case of 35 U.S.C. §103 unobviousness. It is well-settled that

> The invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time . . . That which may be made clear and thus 'obvious' to a court, with the invention fully diagrammed and aided . . . by [experts in the field], may have been a breakthrough of substantial dimension when first unveiled.

Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1138, 227 USPQ 543, 547-548 (Fed. Cir. 1985). Confer Uniroyal Inc. v. Rudkin-Wiley Corp., 5 USPQ 2d 1434, 1438.

> The PTO has the burden under section 103 to establish a *prima facie* case of obviousness (citing In re Piasecki, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984)). It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references (citing In re Lalu, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1984); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 297 n.24, 227 USPQ 657, 667 n.24 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)). This it has not done. The Board points to nothing in the cited references, either alone or in combination, suggesting or teaching Fine's

> invention." In re Fine, 5 USPQ 2d 1596, 1598-99 (Fed. Cir. 1988).
>
> From its discussion of the prior art it appears to us that the court, guided by the defendants, treated each reference as teaching one or more of the specific components for use in the Feil system, although the Feil system did not then exist. Thus the court reconstructed the Feil system, using the blueprint of the Feil claims. As is well established, this is legal error (citing Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 774, 218 USPQ 781, 791 (Fed. Cir. 1983), *cert. denied*, 104 S.Ct. 1284, 224 USPQ 520 (1984)).
>
> Interconnect Planning, *supra.* at 548.

Here the Examiner clearly has used Appellants' claims as a blueprint for combining elements of **Parks**, **van Rooijen** and **Shults** to support his position concerning the 35 U.S.C. §103 obviousness of Appellant's claims. As the above-quoted cases make clear, that is not the analysis contemplated by 35 U.S.C. §103.

More is required to make out a *prima facie* case of obviousness under 35 U. S. C. § 103 than simply finding the isolated bits and pieces of the claimed arrangement in the prior art.

> When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See, e.g., McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001) ("the central question is whether there is reason to combine [the] references," a question of fact drawing on the Graham factors).
>
> The factual inquiry whether to combine references must be thorough and searching." Id. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1124-25, 56 USPQ2d 1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'") (quoting C.R. Bard, Inc., v. M3 Systems, Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232 (Fed. Cir. 1998)); In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); In re Dance, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998)

> (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) ("'teachings of references can be combined only if there is some suggestion or incentive to do so.'") (emphasis in original) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)).
>
> The need for specificity pervades this authority. See, e.g., In re Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) ("particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed"); In re Rouffet, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998) ("even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious."); In re Fritch, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (the examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references").
>
> With respect to Lee's application, neither the examiner nor the Board adequately supported the selection and combination of the Nortrup and Thunderchopper references to render obvious that which Lee described. The examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher." W.L. Gore v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983). Thus the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion.

In re Lee, 61 U. S. P. Q. 2d 1430, 1433-1435, (Fed. Cir., 2002).

Appellant submits that the combination relied upon by the Examiner does not meet the requirements recognized by In re Lee to make out a *prima facie* case of 35 U. S. C. § 103 obviousness. Accordingly, Appellant submits that the 35 U. S. C. § 103 rejection of claims 1-20 and 24-42 based upon the combination of **Parks, van Rooijen** and **Shults** is overcome.

None of **Parks, van Rooijen** or **Shults** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Shults** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Shults** is in error, and must be reversed.

Rejection 2 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Eifler**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Eifler** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Eifler** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Eifler** is non-analogous art to the invention of the present claims. The test for determining whether prior art is analogous for the purpose of determining whether the art can appropriately serve as a basis for a 35 U.S.C. §103 rejection is set forth in, for example, In re Clay, 23 USPQ 2d 1058 (Fed. Cir. 1992) and In re Oetiker, 24 USPQ 2d 1443 (Fed. Cir. 1992). In Clay, for example, the Court observed that

> Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor,

> whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved (citing In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986); In re Wood, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979)). Clay at 1060.

In Clay, the issue was whether a reference (Sydansk) which disclosed a process using a gel for reducing the permeability of hydrocarbon-bearing formations (useful in the recovery of oil from an oil field, for example) was analogous art to Clay's claimed process for using a similar gel to fill a dead volume in the bottom of a liquid hydrocarbon storage tank. Clay, supra. The Court observed that

> Sydansk cannot be considered to be within Clay's field of endeavor merely because both relate to the petroleum industry. Sydansk teaches the use of a gel in unconfined and irregular volumes within generally underground natural oil-bearing formations to channel flow in a desired direction; Clay teaches the introduction of gel to the confined dead volume of a man-made storage tank. The Sydansk process operates in extreme conditions, with petroleum formation temperatures as high as 115°C and at significant well bore pressures; Clay's process apparently operates at ambient temperature and atmospheric pressure. Clay's field of endeavor is the storage of refined liquid hydrocarbons. The field of endeavor of Sydansk's invention, on the other hand, is the extraction of crude petroleum. The Board clearly erred in considering Sydansk to be within the same field of endeavor as Clay's. Clay, supra., emphasis the Court's.

The Court noted that

> Even though the art disclosed in Sydansk is not within Clay's field of endeavor, the reference may still properly be combined with Hetherington [another reference] if it is reasonably pertinent to the problem Clay attempts to solve. In re Wood, 599 F.2d at 1036, 202 USPQ at 174. A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. Clay at 1060-61.

The Court analyzed Sydansk's pertinence to the problem Clay was trying to solve, observing that

> Sydansk's gel treatment of underground formations functions to fill anomalies so as to improve flow profiles and sweep efficiencies of injection and production fluids through a formation, while Clay's gel functions to displace liquid product from the dead volume of a storage tank. Clay at 1061, footnote omitted,

and concluded that

> A person having ordinary skill in the art would not reasonably have expected to solve the problem of dead volume in tanks for storing refined petroleum by considering a reference dealing with plugging underground formation anomalies. The Board's finding to the contrary is clearly erroneous. Since Sydansk is non-analogous art, the rejection over Hetherington in view of Sydansk cannot be sustained. Clay, supra.

In In re Oetiker, supra., Oetiker's invention was an improvement in a hose clamp which was the subject of a prior patent ('004) to Oetiker. The improvement added another feature, a preassembly hook to the '004 patent clamp. The other reference (Lauro) the Examiner combined with the '004 patent teaching to support the 35 U.S.C. §103 rejection related to a plastic hook and eye fastener for garments. The Court noted that

> The examiner explained further by stating that Appellant's device as disclosed could be utilized as part of a garment. The Board did not repeat or support the examiner's argument, or discuss its relevance. Indeed, the argument is not supportable. However, the Board held that the Lauro reference, although not within the appellant's specific field of endeavor is nonetheless analogous art because it relates to a hooking problem, as does Oetiker's invention.
>
> The Board apparently reasoned that all hooking problems are analogous. Oetiker at 1445.

The Court again observed that

> In order to rely on a reference as a basis for rejection of the applicant's invention, the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. See In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986). Patent examination is necessarily conducted by hindsight, with complete knowledge of the applicant's invention, and the courts have recognized the subjective aspects of determining whether an inventor would reasonably be motivated to go to the field in which the examiner found the reference, in order to solve the problem confronting the inventor. We have reminded ourselves and the PTO that it is necessary to consider "the reality of the circumstances," In re Wood, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979) - in other words, common sense - in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor.
>
> It has not been shown that a person of ordinary skill, seeking to solve a problem of fastening a hose clamp, would reasonably be expected or motivated to look to fasteners for garments. The

> combination of elements from non-analogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a prima facie case of obviousness.
>
> * * *
>
> We conclude that the references on which the Board relied were improperly combined. Accordingly, the Board erred in holding the claims unpatentable under section 103. The rejection of claims 1-4 and 16-21 is REVERSED. Oetiker at 1445-46.

Eifler relates to apparatus for sensing the oxygen content of an exhaust gas of an automobile engine. More particularly, **Eifler** is related to an improved resistance type oxygen sensor having a titania resistor and a zirconia resistor for temperature compensation. **Eifler**, col. 1, lines 6-10. There is no mention in **Eifler** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. A person of ordinary skill in the field of the present invention would not have looked to temperature compensation in internal combustion engine exhaust gas sensors for aid in noise immunization of biosensor strips of the type which are the subject of the present application. As such, **Eifler** is non-analogous art to the invention of the present claims.

Further, even assuming that **Eifler** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Eifler** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Eifler neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Eifler neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Eifler neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Eifler neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Eifler neither discloses nor suggests claim 6's specifically recited

"measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Eifler neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Eifler neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Eifler neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Eifler neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Eifler neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Eifler neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Eifler neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Eifler neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Eifler neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Eifler neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Eifler neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Eifler neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Eifler neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Eifler neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Eifler neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Eifler neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Eifler neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Eifler neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Eifler neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Eifler neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Eifler neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Eifler neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Eifler neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Eifler neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Eifler neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Eifler neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Eifler neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Eifler** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks, van Rooijen** or **Eifler** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Eifler** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Eifler** is in error, and must be reversed.

Rejection 3 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Yasuda '918**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Yasuda '918** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Yasuda '918** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Yasuda '918** relates to a gas component detection apparatus for detecting the variation in concentrations of gaseous components such as oxygen, carbon monoxide and hydrocarbons in, for example, exhaust gases from an internal combustion engine. **Yasuda '918**, col. 1, lines 12-17. There is no mention in **Yasuda '918** of

cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. A person of ordinary skill in the field of the present invention would not have looked to temperature compensation in internal combustion engine exhaust gas sensors for aid in noise immunization of biosensor strips of the type which are the subject of the present application. As such, **Yasuda '918** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is incorporated here by reference.

Further, even assuming that **Yasuda '918** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Yasuda '918** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Yasuda '918 neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Yasuda '918 neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Yasuda '918 neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Yasuda '918 neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Yasuda '918 neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Yasuda '918 neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Yasuda '918 neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Yasuda '918 neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Yasuda '918 neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Yasuda '918 neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Yasuda '918 neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Yasuda '918 neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Yasuda '918 neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Yasuda '918 neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Yasuda '918 neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Yasuda '918 neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Yasuda '918 neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Yasuda '918 neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Yasuda '918 neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Yasuda '918 neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Yasuda '918 neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Yasuda '918 neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Yasuda '918 neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Yasuda '918 neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Yasuda '918 neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Yasuda '918 neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a

first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Yasuda '918 neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Yasuda '918 neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Yasuda '918 neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Yasuda '918 neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Yasuda '918 neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Yasuda '918 neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Yasuda '918** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement

loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks**, **van Rooijen** or **Yasuda '918** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks**, **van Rooijen** or **Yasuda '918** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks**, **van Rooijen** and **Yasuda '918** is in error, and must be reversed.

Rejection 4 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks**, **van Rooijen** and **Yasuda '439**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Yasuda '439** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Yasuda '439** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Yasuda '439** relates to a gas component detector which detects the concentration variations of gas components such as oxygen, carbon monoxide and hydrocarbons in the exhaust gas of an internal combustion engine as a variation of the whole atmosphere of the engine. **Yasuda '439**, col. 1, lines 5-10. There is no mention in **Yasuda '439** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. A person of ordinary skill in the field of the present invention would not have looked to temperature compensation in internal combustion engine exhaust gas sensors for aid in noise immunization of biosensor strips of the type which are the subject of the present application. As such, **Yasuda '439** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is

incorporated here by reference.

Further, even assuming that **Yasuda '439** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Yasuda '439** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Yasuda '439 neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Yasuda '439 neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Yasuda '439 neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Yasuda '439 neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Yasuda '439 neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Yasuda '439 neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Yasuda '439 neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Yasuda '439 neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Yasuda '439 neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when

the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Yasuda '439 neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Yasuda '439 neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Yasuda '439 neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Yasuda '439 neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Yasuda '439 neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Yasuda '439 neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Yasuda '439 neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Yasuda '439 neither discloses nor suggests claim 24's specifically recited

"method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Yasuda '439 neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Yasuda '439 neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Yasuda '439 neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Yasuda '439 neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Yasuda '439 neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Yasuda '439 neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Yasuda '439 neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Yasuda '439 neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Yasuda '439 neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Yasuda '439 neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Yasuda '439 neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Yasuda '439 neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Yasuda '439 neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Yasuda '439 neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Yasuda '439 neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Yasuda '439** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks, van Rooijen** or **Yasuda '439** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Yasuda '439** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103

rejection based upon the combination of **Parks, van Rooijen** and **Yasuda '439** is in error, and must be reversed.

Rejection 5 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Yasuda '613**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Yasuda '613** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Yasuda '613** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Yasuda '613** relates to a gas sensing apparatus adapted to be incorporated, for example, in an internal combustion engine exhaust emission control system employing a three-way catalyst so as to sense the air-fuel ratio. **Yasuda '613**, col. 1, lines 5-9. There is no mention in **Yasuda '613** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. A person of ordinary skill in the field of the present invention would not have looked to temperature compensation in internal combustion engine exhaust gas sensors for aid in noise immunization of biosensor strips of the type which are the subject of the present application. As such, **Yasuda '613** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is incorporated here by reference.

Further, even assuming that **Yasuda '613** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Yasuda '613** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of

electromagnetically propagated field energy irradiating the biosensor cell assembly."

Yasuda '613 neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Yasuda '613 neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Yasuda '613 neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Yasuda '613 neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Yasuda '613 neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Yasuda '613 neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Yasuda '613 neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Yasuda '613 neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Yasuda '613 neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Yasuda '613 neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled

to allowance at least on this basis.

Yasuda '613 neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Yasuda '613 neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Yasuda '613 neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Yasuda '613 neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Yasuda '613 neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Yasuda '613 neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Yasuda '613 neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Yasuda '613 neither discloses nor suggests claim 25's specifically recited

"providing a noise cancellation loop on the substrate" [containing the measurement loop].

Yasuda '613 neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Yasuda '613 neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Yasuda '613 neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Yasuda '613 neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Yasuda '613 neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Yasuda '613 neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Yasuda '613 neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Yasuda '613 neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Yasuda '613 neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Yasuda '613 neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase

of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Yasuda '613 neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Yasuda '613 neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Yasuda '613 neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Yasuda '613 neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Yasuda '613** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks, van Rooijen** or **Yasuda '613** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Yasuda '613** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Yasuda '613** is in error, and must be reversed.

Rejection 6 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Tien**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Tien** to teach a primary measuring circuit in a

support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Tien** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Tien** relates to an oxygen sensor for monitoring the oxygen content of internal combustion engine exhaust gases. More particularly, it relates to sensors employing a first resistor having an electrical resistance which varies as a function of the partial pressure of oxygen in the gases to which the sensing element is exposed and a second resistor which compensates for the temperature dependency of the oxygen sensitive resistor. **Tien** is directed to a sensor in which chrome oxide is used in the compensating resistor. **Tien**, col. 1, lines 5-15. There is no mention in **Tien** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. A person of ordinary skill in the field of the present invention would not have looked to temperature compensation in internal combustion engine exhaust gas sensors for aid in noise immunization of biosensor strips of the type which are the subject of the present application. As such, **Tien** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is incorporated here by reference.

Further, even assuming that **Tien** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Tien** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Tien neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Tien neither discloses nor suggests claim 3's specifically recited

"measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Tien neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Tien neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Tien neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Tien neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Tien neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Tien neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Tien neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Tien neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Tien neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the

measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Tien neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Tien neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Tien neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Tien neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Tien neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Tien neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Tien neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Tien neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Tien neither discloses nor suggests claim 27's specifically recited "noise

cancellation loop that circumscribes generally the same area as the measurement loop."

Tien neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Tien neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Tien neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Tien neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Tien neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Tien neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Tien neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Tien neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Tien neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and

the noise cancellation loop to subtract the second current from the first current."

Tien neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Tien neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Tien neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Tien** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks, van Rooijen** or **Tien** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Tien** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Tien** is in error, and must be reversed.

Rejection 7 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Raymond**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Raymond** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Raymond** inherently cancels other effects which would cause an electrical signal in the measuring

circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Raymond** relates to devices employing interdigitated capacitive sensors for the detection and measurement of the concentration of selected non-aqueous fluids, that is, gases and liquids, or specific non-aqueous materials or particles, that is, ions, molecules, or the like in the presence of fluids. The coating layers 20 and 40 on interdigitated capacitors 11 and 31, respectively, of a pair of such interdigitated capacitors 11 and 31 may be the same or different, depending upon what the interdigitated capacitor 11 is to sense, but since the function of interdigitated capacitor 31 is to provide temperature compensation and comparison capacitance to interdigitated capacitor 11, it is important that the two capacitors 11 and 31 have similar thermal characteristics. **Raymond**, col. 1, lines 6-11 and col. 6, lines 7-18. There is no mention in **Raymond** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. As such, **Raymond** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is incorporated here by reference.

Further, even assuming that **Raymond** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Raymond** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Raymond neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Raymond neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Raymond neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Raymond neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Raymond neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on

which they are both arranged.

Raymond neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Raymond neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Raymond neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Raymond neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Raymond neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Raymond neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Raymond neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least

on this basis.

Raymond neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Raymond neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Raymond neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Raymond neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Raymond neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Raymond neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Raymond neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Raymond neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Raymond neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Raymond neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Raymond neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Raymond neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Raymond neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Raymond neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Raymond neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Raymond neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Raymond neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Raymond neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Raymond neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Raymond neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Raymond** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks, van Rooijen** or **Raymond** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Raymond** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Raymond** is in error, and must be reversed.

Rejection 8 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Wohltjen**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Wohltjen** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Wohltjen** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Wohltjen** relates to compensation for the temperature-induced variation in the output from interdigitated surface conductivity cell organic semiconductor film vapor

sensors. **Wohltjen**, col. 2, lines 65-68. There is no mention in **Wohltjen** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. As such, **Wohltjen** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is incorporated here by reference.

Further, even assuming that **Wohltjen** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Wohltjen** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Wohltjen neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Wohltjen neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Wohltjen neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Wohltjen neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Wohltjen neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Wohltjen neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Wohltjen neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Wohltjen neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Wohltjen neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient

electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Wohltjen neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Wohltjen neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Wohltjen neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Wohltjen neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Wohltjen neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Wohltjen neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Wohltjen neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving]

substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Wohltjen neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Wohltjen neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Wohltjen neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Wohltjen neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Wohltjen neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Wohltjen neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Wohltjen neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Wohltjen neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Wohltjen neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Wohltjen neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second

currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Wohltjen neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Wohltjen neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Wohltjen neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Wohltjen neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Wohltjen neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Wohltjen neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Wohltjen** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks**, **van Rooijen** or **Wohltjen** discloses or suggests biosensor electromagnetic noise cancellation.

That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Wohltjen** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Wohltjen** is in error, and must be reversed.

Rejection 9 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Stanbro**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Stanbro** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Stanbro** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Stanbro** relates to devices employing interdigitated capacitive sensors that utilize ion exchange layers. The devices use reference interdigitated capacitors to cancel out changes in the dielectric constant of the sensed liquid medium caused by changes in temperature, general ionic concentration and the physical and chemical state of the liquid medium. **Stanbro**, col. 1, lines 57-58 and col. 2, lines 23-32. There is no mention in **Stanbro** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. As such, **Stanbro** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is incorporated here by reference.

Further, even assuming that **Stanbro** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Stanbro** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop

and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Stanbro neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Stanbro neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Stanbro neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Stanbro neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Stanbro neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Stanbro neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Stanbro neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Stanbro neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Stanbro neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Stanbro neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Stanbro neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Stanbro neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Stanbro neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Stanbro neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Stanbro neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Stanbro neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Stanbro neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Stanbro neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Stanbro neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Stanbro neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Stanbro neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

Stanbro neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Stanbro neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Stanbro neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Stanbro neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Stanbro neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Stanbro neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Stanbro neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase

of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Stanbro neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Stanbro neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Stanbro neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Stanbro neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Stanbro** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks, van Rooijen** or **Stanbro** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Stanbro** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Stanbro** is in error, and must be reversed.

Rejection 10 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **Parks, van Rooijen** and **Pribat**

The Examiner relies upon **Parks** and **van Rooijen** as noted above.

The Examiner relies upon **Pribat** to teach a primary measuring circuit in a support with two electrodes connected to an analyte detection zone for measuring an analyte and a reference measuring circuit also on the support which is electrically distinct from the

analyte detection zone and physically arranged to experience the same environment as the primary measuring circuit. The reference measuring circuit is used to cancel effects such as temperature that are known to affect the measuring circuit. The Examiner concludes that, because of the proximity of the reference circuit to the measuring circuit and the cancellation of electrical effects from the measuring circuit signal, the structure taught by **Pribat** inherently cancels other effects which would cause an electrical signal in the measuring circuit other than an electrical signal from the analyte being measured.

The deficiencies of **Parks** and **van Rooijen** are noted above, and are incorporated here by reference.

First, **Pribat** relates to temperature compensated oxygen sensors of the resistive type for the measurement of relative concentrations of fluid reactive species. It pertains notably to a device capable of producing a signal for the closed loop control of an air/fuel mixture, such as the mixtures that feed combustion machines of the internal combustion engine type, or boilers, in particular, boilers with forced air circulation. **Pribat**, col. 1, lines 9-16. There is no mention in **Pribat** of cancellation of electromagnetically propagated field energy irradiating a biosensor cell assembly. A person of ordinary skill in the field of the present invention would not have looked to temperature compensation in internal combustion engine sensors or boiler sensors for aid in noise immunization of biosensor strips of the type which are the subject of the present application. As such, **Pribat** is non-analogous art to the invention of the present claims. The analysis from the above discussion of **Eifler** concerning non-analogous art is incorporated here by reference.

Further, even assuming that **Pribat** were analogous art to the present claims (and Appellant vigorously denies that this is so), **Pribat** neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Pribat neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

Pribat neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

Pribat neither discloses nor suggests claim 4's specifically recited

"measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

Pribat neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

Pribat neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

Pribat neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

Pribat neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Pribat neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

Pribat neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Pribat neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

Pribat neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

Pribat neither discloses nor suggests that claim 15's specifically recited

"measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

Pribat neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

Pribat neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

Pribat neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

Pribat neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

Pribat neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

Pribat neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

Pribat neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

Pribat neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

Pribat neither discloses nor suggests claim 28's specifically recited "noise

cancellation loop adjacent the measurement loop."

Pribat neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

Pribat neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

Pribat neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

Pribat neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

Pribat neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

Pribat neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

Pribat neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

Pribat neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

Pribat neither discloses nor suggests claim 39's specifically recited

"providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

Pribat neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

Pribat neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **Pribat** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **Parks, van Rooijen** or **Pribat** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **Parks, van Rooijen** or **Pribat** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **Parks, van Rooijen** and **Pribat** is in error, and must be reversed.

Rejection 11 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Shults**

The Examiner relies upon **White** to teach a biosensing meter and a sample strip 10 having two spaced apart, electrically isolated electrodes 12, 14, forming a measurement loop that includes a reaction zone on a substrate 16. The sample strip includes a cover sheet 18 provided with openings 20, 21, which expose the electrodes. One opening, 20, forms a well and defines a reaction zone between the electrodes. The second opening, 21, exposes the electrodes so that when sample strip 10 is inserted into the biosensing meter, electrical connection can be made thereto. The Examiner concedes that **White** does not teach a noise cancellation loop to cancel the effects of electromagnetically propagated energy.

The Examiner relies upon **van Rooijen** and **Shults** as noted above.

White neither discloses nor suggests claim 1's specifically recited "noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the

same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly."

White neither discloses nor suggests claim 2's specifically recited "noise cancellation loop [ ] on the substrate" [containing the measurement loop].

White neither discloses nor suggests claim 3's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on the same side of [a] substrate" [containing a test cell and a measurement loop].

White neither discloses nor suggests claim 4's specifically recited "measurement loop and [ ] noise cancellation loop circumscrib[ing] generally the same area."

White neither discloses nor suggests claim 5's specifically recited "measurement loop and [ ] noise cancellation loop [ ] located adjacent each other."

White neither discloses nor suggests claim 6's specifically recited "measurement loop and [ ] noise cancellation loop [ ] on opposite sides of [a] substrate" on which they are both arranged.

White neither discloses nor suggests claim 7's specifically recited "measurement loop and the noise cancellation loop [which] are substantially congruent."

White neither discloses nor suggests claim 8's specifically recited "instrument electrically connectable to the measurement loop, [ ] wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

White neither discloses nor suggests claim 9's specifically recited "noise cancellation loop [ ] substantially congruent to the measurement loop."

White neither discloses nor suggests claim 10's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when [the measurement loop is] exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein [when the noise cancellation loop is exposed to an ambient electromagnetic field], the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

White neither discloses nor suggests that claim 11's specifically recited "first and second currents are combined to substantially cancel the effect of the ambient

electromagnetic field on the biosensing cell assembly."

Claims 12 and 13 depend directly or indirectly from claim 11, and are entitled to allowance at least on this basis.

White neither discloses nor suggests that claim 14's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together."

White neither discloses nor suggests that claim 15's specifically recited "measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current."

Claim 16 depends directly from claim 1, and is entitled to allowance at least on this basis.

White neither discloses nor suggests that claim 17's specifically recited "predetermined impedance is included in the noise cancellation loop."

White neither discloses nor suggests that claim 18's specifically recited "predetermined impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration."

White neither discloses nor suggests that claim 19's specifically recited "impedance in the noise cancellation loop is substantially frequency independent."

White neither discloses nor suggests claim 20's specifically recited "noise cancellation loop ha[ving] a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, ha[ving] substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop."

White neither discloses nor suggests claim 24's specifically recited "method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising . . . providing a noise cancellation loop electrically distinct from the analyte reaction zone [of a test cell of a measurement loop on a substrate] and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy

irradiating the biosensor cell assembly."

White neither discloses nor suggests claim 25's specifically recited "providing a noise cancellation loop on the substrate" [containing the measurement loop].

White neither discloses nor suggests claim 26's specifically recited "providing a noise cancellation loop on the same side of the substrate as the measurement loop."

White neither discloses nor suggests claim 27's specifically recited "noise cancellation loop that circumscribes generally the same area as the measurement loop."

White neither discloses nor suggests claim 28's specifically recited "noise cancellation loop adjacent the measurement loop."

White neither discloses nor suggests claim 29's specifically recited "noise cancellation loop on an opposite side of the substrate from the measurement loop."

White neither discloses nor suggests claim 30's specifically recited "noise cancellation loop which is substantially congruent with the measurement loop."

White neither discloses nor suggests claim 31's specifically recited "instrument electrically connectable to the measurement loop, and [ ] noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument."

White neither discloses nor suggests claim 32's specifically recited "noise cancellation loop which is substantially congruent to the measurement loop."

White neither discloses nor suggests claim 33's specifically recited "measurement loop [ ] physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and [ ] noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly."

White neither discloses nor suggests claim 34's specifically recited "combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly."

Claims 35 and 36 depend directly or indirectly from claim 33, and are entitled to allowance at least on this basis.

White neither discloses nor suggests claim 37's specifically recited "arranging the measurement loop and the noise cancellation loop physically so that the phase of the

second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together."

White neither discloses nor suggests claim 38's specifically recited "physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current."

White neither discloses nor suggests claim 39's specifically recited "providing in the noise cancellation loop [the] predetermined impedance [of the test cell in response to various concentrations of the analyte]."

White neither discloses nor suggests claim 40's specifically recited "providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell."

White neither discloses nor suggests claim 41's specifically recited "providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent."

Finally, **White** neither discloses nor suggests claim 42's specifically recited "providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop."

The deficiencies of **van Rooijen** and **Shults** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White, van Rooijen** or **Shults** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White, van Rooijen** or **Shults** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White, van Rooijen** and **Shults** is in error, and must be reversed.

Rejection 12 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Eifler**

The Examiner relies upon **White, van Rooijen** and **Eifler** as noted above.

The deficiencies of all of **White, van Rooijen** and **Eifler** are noted above, and

are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White**, **van Rooijen** or **Eifler** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White**, **van Rooijen** or **Eifler** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White**, **van Rooijen** and **Eifler** is in error, and must be reversed.

Rejection 13 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Yasuda '918**

The Examiner relies upon **White**, **van Rooijen** and **Yasuda '918** as noted above.

The deficiencies of all of **White**, **van Rooijen** and **Yasuda '918** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White**, **van Rooijen** or **Yasuda '918** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White**, **van Rooijen** or **Yasuda '918** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White**, **van Rooijen** and **Yasuda '918** is in error, and must be reversed.

Rejection 14 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White**, **van Rooijen** and **Yasuda '439**

The Examiner relies upon **White**, **van Rooijen** and **Yasuda '439** as noted above.

The deficiencies of all of **White**, **van Rooijen** and **Yasuda '439** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White**, **van Rooijen** or **Yasuda '439** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White**, **van Rooijen** or **Yasuda '439** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White**, **van Rooijen** and **Yasuda '439** is in error,

and must be reversed.

Rejection 15 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Yasuda '613**

The Examiner relies upon **White, van Rooijen** and **Yasuda '613** as noted above.

The deficiencies of all of **White, van Rooijen** and **Yasuda '613** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White, van Rooijen** or **Yasuda '613** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White, van Rooijen** or **Yasuda '613** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White, van Rooijen** and **Yasuda '613** is in error, and must be reversed.

Rejection 16 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Tien**

The Examiner relies upon **White, van Rooijen** and **Tien** as noted above.

The deficiencies of all of **White, van Rooijen** and **Tien** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White, van Rooijen** or **Tien** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White, van Rooijen** or **Tien** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White, van Rooijen** and **Tien** is in error, and must be reversed.

Rejection 17 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Raymond**

The Examiner relies upon **White, van Rooijen** and **Raymond** as noted above.

The deficiencies of all of **White, van Rooijen** and **Raymond** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White, van**

Rooijen or **Raymond** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White, van Rooijen** or **Raymond** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White, van Rooijen** and **Raymond** is in error, and must be reversed.

Rejection 18 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Wohltjen**

The Examiner relies upon **White, van Rooijen** and **Wohltjen** as noted above.

The deficiencies of all of **White, van Rooijen** and **Wohltjen** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White, van Rooijen** or **Wohltjen** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White, van Rooijen** or **Wohltjen** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White, van Rooijen** and **Wohltjen** is in error, and must be reversed.

Rejection 19 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Stanbro**

The Examiner relies upon **White, van Rooijen** and **Stanbro** as noted above.

The deficiencies of all of **White, van Rooijen** and **Stanbro** are noted above, and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White, van Rooijen** or **Stanbro** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White, van Rooijen** or **Stanbro** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White, van Rooijen** and **Stanbro** is in error, and must be reversed.

Rejection 20 -- Whether claims 1-20 and 24-42 would have been 35 U. S. C. § 103 obvious based upon the combination of **White, van Rooijen** and **Pribat**

The Examiner relies upon **White, van Rooijen** and **Pribat** as noted above.

The deficiencies of all of **White, van Rooijen** and **Pribat** are noted above,

and are incorporated here by reference.

The discussion of the absence of motivation to combine references contained in the discussion of rejection 1 above is incorporated here by reference. None of **White, van Rooijen** or **Pribat** discloses or suggests biosensor electromagnetic noise cancellation. That which is neither disclosed nor suggested by any of **White, van Rooijen** or **Pribat** cannot be disclosed by any combination of them. Accordingly, the 35 U. S. C. § 103 rejection based upon the combination of **White, van Rooijen** and **Pribat** is in error, and must be reversed.

Summary and Conclusion

The rejections of claims 1-20 and 24-42 under 35 U. S. C. § 103 based upon the combinations of :

(1) **Parks, van Rooijen** and **Shults**;

(2) **Parks, van Rooijen** and **Eifler**;

(3) **Parks, van Rooijen** and **Yasuda '918**;

(4) **Parks, van Rooijen** and **Yasuda '439**;

(5) **Parks, van Rooijen** and **Yasuda '613**;

(6) **Parks, van Rooijen** and **Tien**;

(7) **Parks, van Rooijen** and **Raymond**;

(8) **Parks, van Rooijen** and **Wohltjen**;

(9) **Parks, van Rooijen** and **Stanbro**;

(10) **Parks, van Rooijen** and **Pribat**;

(11) **White, van Rooijen** and **Shults**;

(12) **White, van Rooijen** and **Eifler**;

(13) **White, van Rooijen** and **Yasuda '918**;

(14) **White, van Rooijen** and **Yasuda '439**;

(15) **White, van Rooijen** and **Yasuda '613**;

(16) **White, van Rooijen** and **Tien**;

(17) **White, van Rooijen** and **Raymond**;

(18) **White, van Rooijen** and **Wohltjen**;

(19) **White, van Rooijen** and **Stanbro**; and,

(20) **White, van Rooijen** and **Pribat** are thus all demonstrated to be in error, for at least all the reasons set forth herein. Accordingly, Appellant submits that the final rejection of his claims 1-20 and 24-42 is erroneous and should be reversed. Such action is respectfully requested.

Respectfully submitted,

Richard D. Conard
Attorney Reg. No. 27321
Attorney for Appellant

Indianapolis, Indiana
(317)231-7285
INDS02 RDC 661649

The Claims On Appeal

1. A Cottrell current-type biosensing cell assembly comprising:

a. a substrate having a proximal end and a distal end;

b. a measurement loop located on the substrate, the measurement loop including:

i. a pair of spaced-apart conductors each having a proximal end and a distal end, the proximal ends located at the proximal end of the substrate for connection to an instrument,

ii. a test cell connected across the distal ends of the conductors, the test cell having an analyte reaction zone with an electrical impedance that varies in response to analyte concentration, the variation in electrical impedance of the analyte reaction zone in response to the application of an analyte, the concentration of which is to be determined, producing a Cottrell current-like profile; and

c. a noise cancellation loop electrically distinct from the analyte reaction zone and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly.

2. The biosensing cell assembly of claim 1 wherein the noise cancellation loop is on the substrate.

3. The biosensing cell assembly of claim 2 wherein the measurement loop and the noise cancellation loop are on the same side of the substrate.

4. The biosensing cell assembly of claim 3 wherein the measurement loop and the noise cancellation loop circumscribe generally the same area.

5. The biosensing cell assembly of claim 3 wherein the measurement loop and the noise cancellation loop are located adjacent each other.

6. The biosensing cell assembly of claim 2 wherein the measurement loop and the noise cancellation loop are on opposite sides of the substrate.

7. The biosensing cell assembly of claim 6 wherein the measurement loop and the noise cancellation loop are substantially congruent.

8. The biosensing cell assembly of claim 1, further comprising an instrument electrically connectable to the measurement loop, and further wherein the noise cancellation loop is located on a structure adjacent the measurement loop when the measurement loop is connected to the instrument.

9. The biosensing cell assembly of claim 8 wherein the noise cancellation loop is substantially congruent to the measurement loop.

10. The biosensing cell assembly of claim 1 wherein the measurement loop is physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and wherein the noise cancellation loop is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and wherein the first and second currents are combined to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly.

11 The biosensing cell of claim 10 wherein the first and second currents are combined to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly.

12. The biosensing cell assembly of claim 10 further including means for determining a response current to provide an indication of an analyte concentration.

13. The biosensing cell assembly of claim 12 wherein the means for determining the response current comprises a voltage source to apply a voltage across the test cell via the pair of conductors in the measurement loop and an amplifier connected to amplify the response current resulting therefrom.

14. The biosensing cell assembly of claim 13 wherein the measurement loop and the noise cancellation loop are physically arranged to have the phase of the second current displaced by 180 degrees from the phase of the first current and the measurement loop and the noise cancellation loop are electrically connected to add the first and second currents together.

15. The biosensing cell assembly of claim 13 wherein the measurement loop and the noise cancellation loop are physically arranged to have the first and second currents in phase with each other and the measurement loop and the noise cancellation loop are electrically connected to subtract the second current from the first current.

16. The biosensing cell assembly of claim 1 wherein the electrical impedance of the test cell varies within a predetermined range in response to various concentrations of the analyte.

17. The biosensing cell assembly of claim 16 wherein a predetermined impedance is included in the noise cancellation loop.

18. The biosensing cell assembly of claim 17 wherein the predetermined

impedance included in the noise cancellation loop is within the impedance range of the test cell when the test cell is amperometrically monitoring a response current to provide an indication of the analyte concentration.

19. The biosensing cell assembly of claim 17 wherein the impedance in the noise cancellation loop is substantially frequency independent.

20. The biosensing cell assembly of claim 17 wherein the noise cancellation loop has a pair of conductors, and the combination of the impedance in the noise cancellation loop, together with the conductors of the noise cancellation loop, has substantially the same frequency response characteristics as the combination of the test cell and conductors of the measurement loop.

24. A method for adjusting the output of a Cottrell current-type biosensing cell assembly comprising:

a. a substrate having a proximal end and a distal end;

b. a measurement loop located on the substrate, the measurement loop including:

i. a pair of spaced-apart conductors each having a proximal end and a distal end, the proximal ends located at the proximal end of the substrate for connection to an instrument,

ii. a test cell connected across the distal ends of the conductors, the test cell having an analyte reaction zone with an electrical impedance that varies in response to analyte concentration, the variation in electrical impedance of the analyte reaction zone in response to the application of an analyte, the concentration of which is to be determined, producing a Cottrell current-like profile; the method including

c. providing a noise cancellation loop electrically distinct from the analyte reaction zone and physically arranged to be exposed to substantially the same electromagnetic environment as the measurement loop and electrically connected to substantially cancel the effect of electromagnetically propagated field energy irradiating the biosensor cell assembly.

25. The method of claim 24 wherein providing a noise cancellation loop comprises providing a noise cancellation loop on the substrate.

26. The method of claim 25 wherein providing the noise cancellation loop comprises providing a noise cancellation loop on the same side of the substrate as the measurement loop.

27. The method of claim 26 wherein providing the noise cancellation loop

comprises providing a noise cancellation loop that circumscribes generally the same area as the measurement loop.

28. The method of claim 26 wherein providing the noise cancellation loop comprises providing a noise cancellation loop adjacent the measurement loop.

29. The method of claim 25 wherein providing the noise cancellation loop comprises providing a noise cancellation loop on an opposite side of the substrate from the measurement loop.

30. The method of claim 29 wherein providing the noise cancellation loop comprises providing a noise cancellation loop which is substantially congruent with the measurement loop.

31. The method of claim 24, further comprising providing an instrument electrically connectable to the measurement loop, and providing the noise cancellation loop comprises providing a noise cancellation loop on a structure adjacent the measurement loop when the measurement loop is connected to the instrument.

32. The method of claim 31 wherein providing the noise cancellation loop comprises providing a noise cancellation loop which is substantially congruent to the measurement loop.

33. The method of claim 24 wherein the measurement loop is physically arranged to have a first current induced therein having a first phase associated therewith when exposed to an ambient electromagnetic field and wherein providing the noise cancellation loop comprises providing a noise cancellation loop which is physically arranged to have a second current induced therein, the second current having a second phase associated therewith when the noise cancellation loop is exposed to the same ambient electromagnetic field and combining the first and second currents to substantially reduce the effect of the ambient electromagnetic field on the biosensing cell assembly.

34 The method of claim 33 wherein combining the first and second currents to substantially reduce the effect of the ambient electromagnetic filed on the biosensing cell assembly comprises combining the first and second currents to substantially cancel the effect of the ambient electromagnetic field on the biosensing cell assembly.

35. The method of claim 33 further including determining a response current to provide an indication of an analyte concentration.

36. The method of claim 35 wherein determining the response current comprises providing a voltage source to apply a voltage across the test cell via the pair of conductors in the measurement loop and providing an amplifier connected to amplify the

response current resulting therefrom.

37. The method of claim 36 comprising arranging the measurement loop and the noise cancellation loop physically so that the phase of the second current is displaced by 180 degrees from the phase of the first current and electrically connecting the measurement loop and the noise cancellation loop to add the first and second currents together.

38. The method of claim 36 comprising physically arranging the measurement loop and the noise cancellation loop so that the first and second currents are in phase with each other and electrically connecting the measurement loop and the noise cancellation loop to subtract the second current from the first current.

39. The method of claim 24 wherein the electrical impedance of the test cell varies within a predetermined range in response to various concentrations of the analyte, providing a noise cancellation loop including providing in the noise cancellation loop a predetermined impedance.

40. The method of claim 39 wherein providing in the noise cancellation loop a predetermined impedance comprises providing in the noise cancellation loop a predetermined impedance within the predetermined range of the electrical impedance of the test cell.

41. The method of claim 39 wherein providing in the noise cancellation loop a predetermined impedance comprises providing in the noise cancellation loop a predetermined impedance which is substantially frequency independent.

42. The method of claim 39 wherein providing a noise cancellation loop comprises providing a noise cancellation loop having a pair of conductors, the combination of the predetermined impedance and the pair of conductors of the noise cancellation loop having a frequency response characteristics which is substantially the same as the frequency response characteristic of the combination of the test cell and conductors of the measurement loop.